

**【CLAIMS】****【Claim 1】**

A cyclonic plasma pyrolysis/vitrification system pyrolyzing and vitrifying waste materials into exhaust gas and slag using a plasma torch, the system comprising: a main reactor having a waste inlet supplying waste materials, an exhaust gas outlet discharging exhaust gas, and a slag outlet discharging slag; a plasma torch inclined at a predetermined angle with respect to the internal bottom surface of the main reactor to give a maximum circulating power to the exhaust gas, pyrolyzing and vitrifying the waste materials; an auxiliary reactor connected to the exhaust gas outlet of the main reactor, discharging the exhaust gas to the outside; a slag discharger connected to the slag outlet of the main reactor, discharging the slag to the outside; wherein the plasma torch circulates the exhaust gas in the main reactor with a maximum circulating power by strong plasma jet, and makes flyashes contained in the circulating exhaust gas to be melted after being absorbed into melted materials of waste materials in both inner walls and bottom surface of the main reactor by a centrifugal force.

**【Claim 2】**

The cyclonic plasma pyrolysis/vitrification system of claim 1 wherein the slag discharger is formed just under the plasma torch.

**【Claim 3】**

The cyclonic plasma pyrolysis/vitrification system of claim 1, including the waste inlet and the exhaust gas outlet having a designated distance therebetween in the main reactor, and further including a separator wall with a designated length formed therebetween.

**【Claim 4】**

The cyclonic plasma pyrolysis/vitrification system of claim 1, wherein the exhaust gas outlet is disposed in the center of the circulating exhaust gas, namely, in the center of an inner wall of the main reactor.

**【Claim 5】**

5        The cyclonic plasma pyrolysis/vitrification system of claim 1, wherein the plasma torch is inclined at the angle ranging from 20 to 40 degrees with respect to the bottom surface of the main reactor.